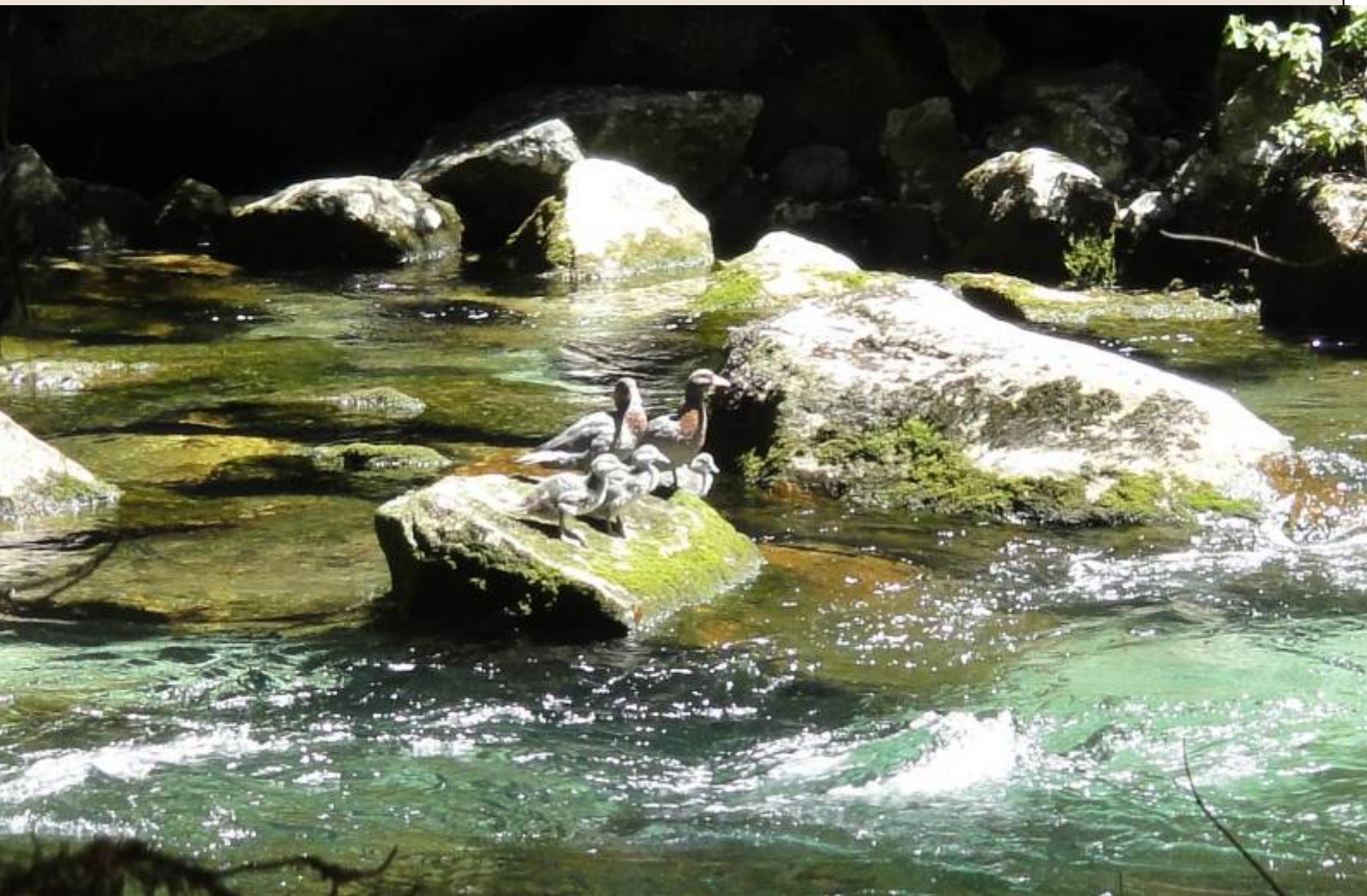




# Whio Protection in Northern Fiordland National Park

Clinton, Arthur, Cleddau & Worsley Valleys

**Annual Report 2010/11**



Cover image - Whio family in Clinton North Branch, December 2010 (Shinji Kameyama).

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# Summary

Good progress has been made towards outcome targets for whio/blue duck (*Hymenolaimus malachorhynchus*) recovery this season in the Northern Fiordland Whio Protection Area in Fiordland National Park. Seventy-seven whio ducklings were assumed to have fledged from the monitored area during the 2010/11 season, which is the highest number recorded since monitoring began. There are 44 pairs of whio currently known from within the stoat trapped area at the end of the 2010/11 season, seven pairs higher than the previous season. The goal of the Whio Recovery Group is to have at least 50 pairs within the trapped area by 2017, and with current progress it is likely that this goal will be achieved.

Stoats were identified as the main agent of decline of whio populations in Fiordland during a six year study involving intensive nest monitoring of banded birds within the Clinton and Arthur valleys (2000-2006). In the absence of stoat control whio experienced high nest failure due to stoat predation and all adult female mortality was attributed to stoat predation. In comparison, nesting success improved significantly once stoat control was established and the proportion of females killed by stoats decreased.

There was low beech seed production during autumn 2010, and rat and stoat abundance remained at normal densities during the 2010/11 season based on trap catch results. There was a significant amount of silver beech seed recorded in the monitoring trays in the Clinton and Sinbad valleys during autumn 2011, and rodent levels are expected to rise in response in the area through winter and spring 2011.

This report summarises the animal pest control and monitoring carried out in the Clinton, Arthur, and Cleddau Valleys between July 2010 and June 2011. The valley floor stoat trap lines were maintained and whio river surveys conducted.

# Introduction

The Clinton/Arthur/Cleddau/Worsley operational area lies within the northern part of Fiordland National Park (Fig 1), and contains one of the more robust populations of whio/blue duck in the South Island. The operational area is identified as one of the eight high priority Security Sites by the Whio Recovery Group (van Klink 2007). Stoat control is targeted at whio recovery, but other native species present that may benefit from stoat trapping include South Island kaka, western weka, Fiordland tokoeka (kiwi), and South Island robin.

The valleys are glacially formed, with steep to vertical side walls and a generally flat valley floor 500-800m wide. The Milford Track passes through the Clinton and Arthur valleys, crossing Mackinnon Pass (1069 m). The area is an important tourism location with up to 18,000 people walking the Milford Track annually, and an estimated 450 000 people visiting Milford Sound each year. The road from Te Anau through to Milford Sound follows down the Cleddau River after passing through Homer Tunnel (920m a.s.l.). The Worsley and Castle valleys are part of the Fiordland Wapiti Area, and are popular hunting and trout fishing destinations.

The upper sections of many of these valleys are prone to large damaging avalanches which can restrict access to trappers and monitoring staff during winter and spring. Heavy snowfalls during winter and spring can also close the Milford Road during periods of high avalanche hazard. Heavy rain driven by strong north-west weather systems can cause rivers to flood rapidly in the area, and rainfall events of 150-200 mm per day are not uncommon.

The forest within the valleys is predominantly silver beech (*Nothofagus menziesii*), with snow tussock, alpine communities, bare rock and snowfields above the bushline. The silver beech forest is relatively simple in its structure, with the forest floor containing a diversity of ferns and shrubs. Some red beech (*Nothofagus fusca*) is also found in the lower Clinton Valley between Hirere and Glade House, and in the lower Arthur Valley. The lower section of the Arthur and Cleddau valleys generally contain a more diverse mix of forest trees, with the forest containing scattered podocarps including rimu (*Dacrydium cupressinum*), totara (*Podocarpus hallii*), miro (*Prumnopitys ferruginea*), kamahi (*Weinmannia racemosa*), and a number of plant species not encountered further up valley. At higher altitude, mountain beech (*Nothofagus solandri* var. *cliffortoides*) is found with the occasional southern rata (*Metrosideros umbellata*). Slips and avalanche paths are common and tend to be covered with mountain ribbonwood (*Hoheria lyallii*), tree fuchsia (*Fuchsia excorticata*), *Olearia illicifolia*, and prickly shield fern (*Polystichum vestitum*).

Monitoring of the annual beech seedfall has been carried out in the lower Clinton Valley since 2005, using a line of eight seed collecting trays. There was very low beech seed production recorded in 2010, and a substantial silver beech mast was recorded in 2011.

Stoat control has been carried out in the Clinton Valley continuously since 2000, in the Cleddau since 2002, in the Arthur since 2003, and in the Worsley/Castle and Joes since 2005. Traps were established in the upper sections of the Neale Burn and Clinton North Branch at the start of the 2008/09 season. Traps have generally been checked and rebaited every six weeks between mid-September and mid May during the 2010/11 season.

Rodent and mustelid abundance has been monitored in past years using standard tracking tunnel methods, Gillies & Williams (2005), however these 20 tracking tunnel lines were not run this season.

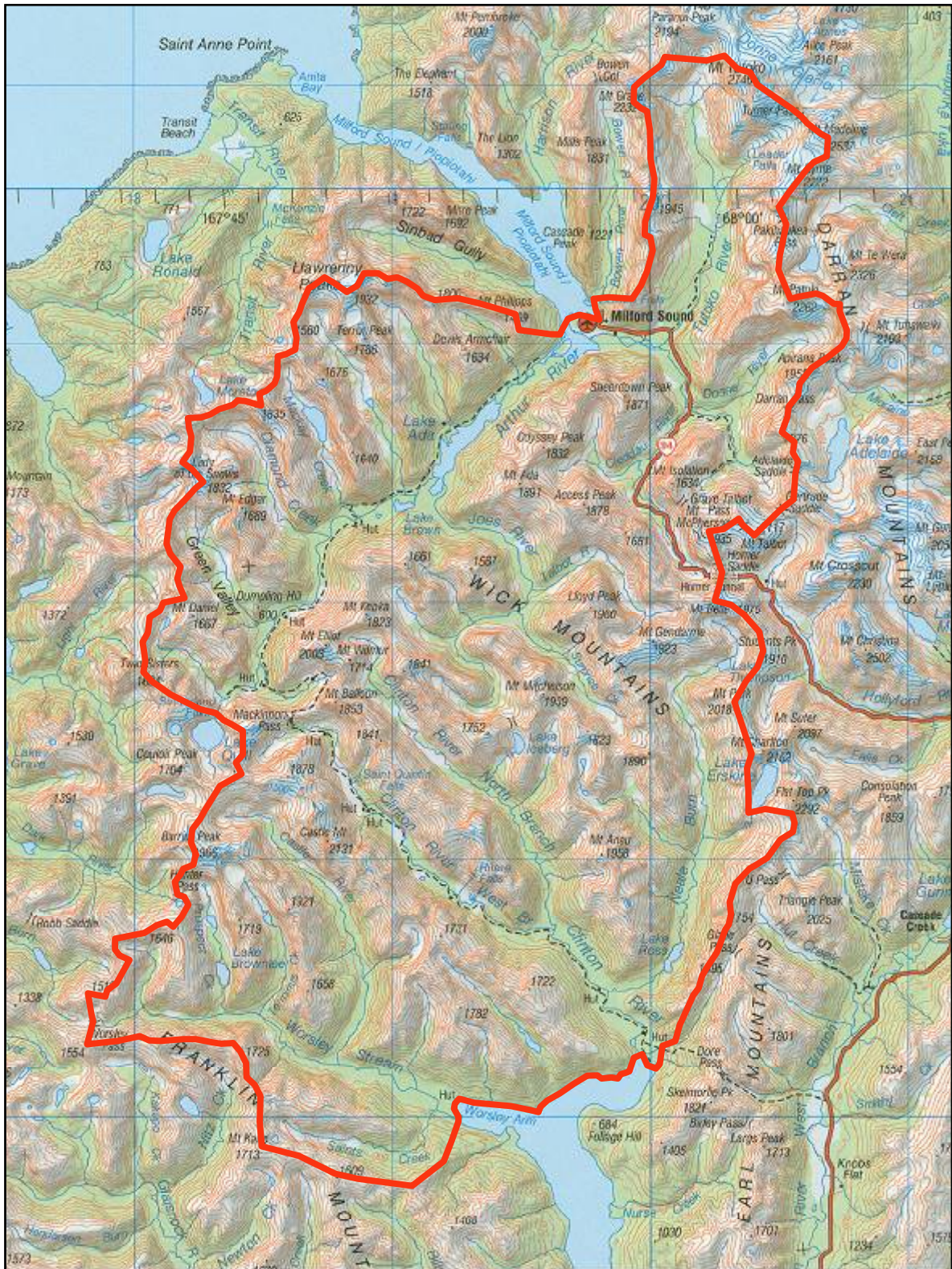


Figure 1 - Northern Fiordland Whio Protection Site, comprises a total area of approximately 65 000 ha.

# Whio outcome target

As one of the eight Security Sites identified by the Whio Recovery Plan 2007-17 (van Klink 2007); the outcome target of the Clinton/Arthur/Cleddau/Worsley site is to contain a minimum of 50 pairs of whio within the stoat trapped area by 2017.

## Predictive monitoring

Seed fall of beech species has been monitored annually during autumn using a line of eight seed collection trays near Clinton Hut since 2005, and since 2011 in the Sinbad Gully northwest of Milford Sound. The amount of seed that southern beech species (*Nothofagus sp*) produce varies considerably from year to year. Generally there is a low amount of seed produced during autumn, however some years the amount of seeding substantially increases. Rodent levels in the forest generally fluctuate in response to the food provided by the annual beech seed crop, and heavy seeding years can lead to damaging irruptions of rats and mice through winter and spring. Monitoring the amount of beech seed that falls in autumn is a useful way to predict probable trends in rodent populations for the following season.

There was a moderate-high level of silver beech seeding recorded on the Clinton monitoring line, and a moderate level recorded in the Sinbad (Table 1). The level of seeding recorded in the Clinton Valley is likely to cause a rise in rodent numbers heading into winter and spring 2011.

Collected material has been counted and analysed at Canterbury University along with material from other monitored sites.

**Table 1- Total number of seeds collected per site Feb-Sept 2011**

	Clinton	Sinbad
Red beech	796	0
Silver beech	12,255	7718
Mountain beech	626	0
<b>TOTAL</b>	<b>13,677</b>	<b>7718</b>

**Table 2- Total seeds m<sup>2</sup> per site Feb-Sept 2011**

	Clinton	Sinbad
Red beech	355	0
Silver beech	5471	3446
Mountain beech	279	0
<b>TOTAL</b>	<b>6106 seeds m<sup>2</sup></b>	<b>3446 seeds m<sup>2</sup></b>

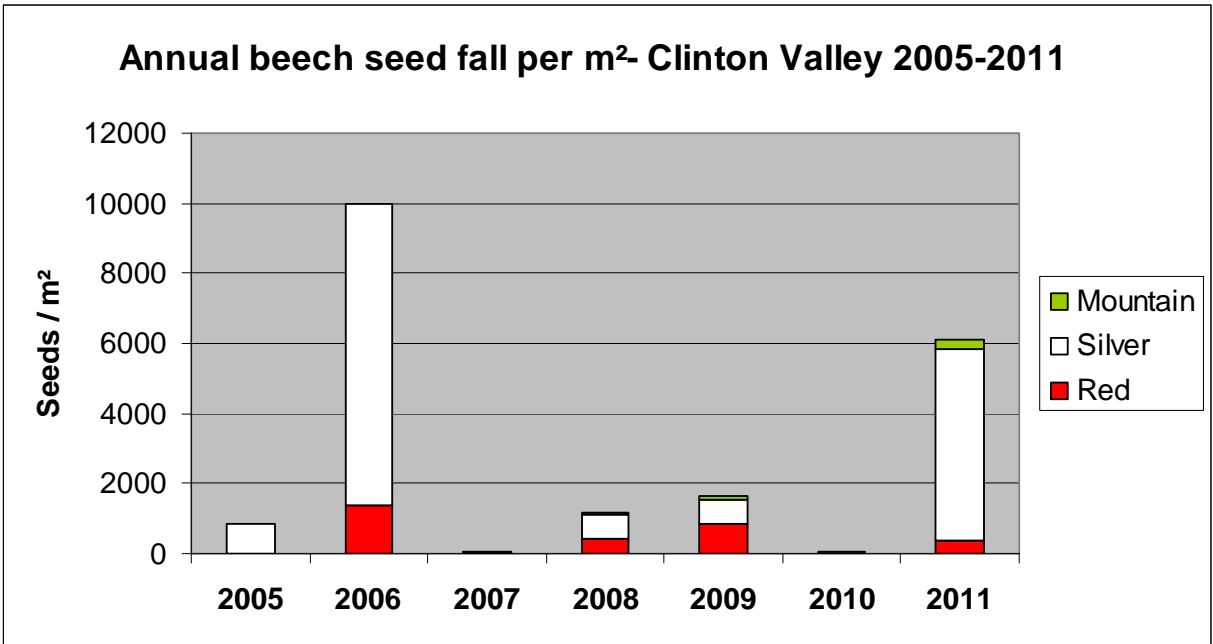


Figure 2- Annual beech seed fall monitoring results.

# Stoat Control

Stoat control in the Clinton, Arthur, and Cleddau catchments generally consists of wooden tunnels containing two stainless DOC-150 traps. Tunnels in the Worsley and Castle valleys contain two Mk IV Fenn traps currently. Tunnels are spaced 150-200m apart along walking tracks and the Milford Road (Appendix 1).

Most traps were checked at least six times between September 2010 and May 2011 approximately every six weeks, and rebaited with a hen's egg and a piece of venison or rabbit meat.

A total of 737 stoat trap tunnels were operational through the Clinton/Arthur/Cleddau area during the 2010/11 season. Traps in the Clinton, North Branch, Neale Burn, Arthur, and Joes were serviced by DOC staff; traps in the Cleddau catchment were serviced by contractors (DJ Hansen Contracting) and volunteers from Trips & Tramps (Steve Norris and Steve Mancer). An additional 184 stoat trap tunnels in the Worsley and Castle valleys were serviced by volunteers from the Fiordland Wapiti Foundation.

Valley	Number of stoat trap tunnels	Traps serviced by
Clinton/Neale Burn	261	DOC staff
Arthur/Joes	302 *	DOC staff
Cleddau	174 #	Contractor and volunteers from Trips & Tramps
Worsley/Castle	184	Volunteers from Fiordland Wapiti Foundation
<b>TOTAL</b>	<b>921</b>	

\* Includes 110 single tunnels around Lake Brown/Lake Ada

# Includes 44 single tunnels in Cleddau Delta

A total of 232 stoats and 465 rats were caught across all Clinton/Arthur/Cleddau trap lines during the 2010/11 season. The usual summer spike in stoat captures was evident, with around 60% of the total annual catch being recorded in the months of January, February, and March. Rat captures were more stable through the year, with a peak recorded in September due to some trap lines not being serviced through winter due to avalanche hazard.

See Appendix 4 for a monthly breakdown of trap capture results.



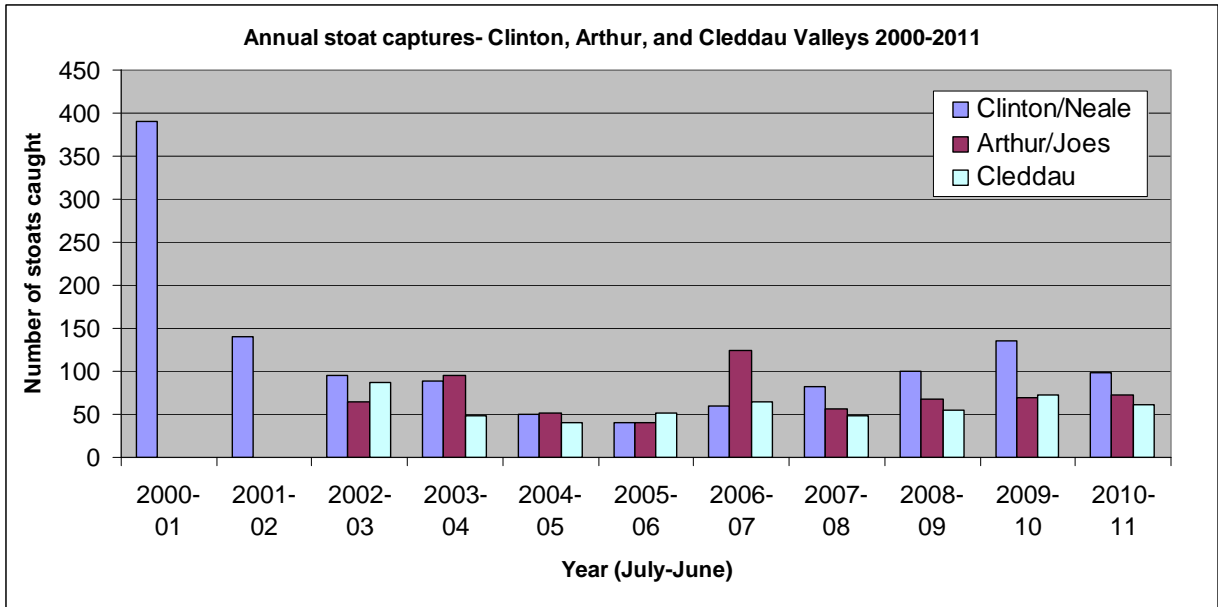


Figure 3- Total number of stoats trapped per catchment.

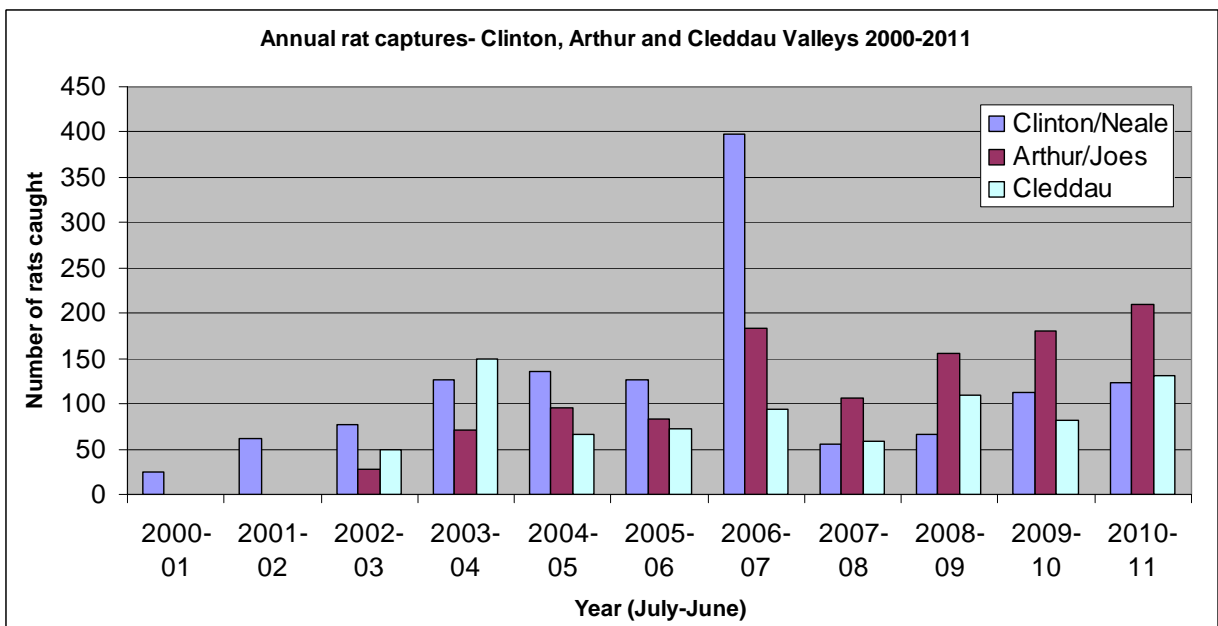


Figure 3- Total number of rats trapped per catchment.

## Stoat trap tunnel trial in Clinton North Branch and Neale Burn

During September 2008 100 double-set DOC-150 tunnels were laid out 200m apart along tracks to extend trap lines to near the head of the Clinton North Branch and Neale Burn valleys. Sixty-six tunnels were laid in the Neale Burn and 34 tunnels were laid in the upper North Branch. Half of these tunnels are standard double tunnels with mesh baffles and entrance holes in the end wire mesh. The other half are similar length double tunnels with side entrances cut in the timber wall (Fig 4). Both tunnel types are designed to exclude weka.

Tunnels were laid out alternating between design types and capture data is planned to be analysed to determine if there is any significant difference between designs and results written up during 2012.

Results of this trial so far indicate that stoat do not have an aversion to going into side entrance tunnels compared with the traditional end entrance design after three years of trapping.



Figure 4- Side entrance tunnel (left) and mesh end entrance tunnel design (right), with capture totals at September 2011.

# Possum trap trial

A possum kill-trap trial was set up in May 2010 in part of the Cleddau Valley to compare “*Efficacy of Sentinel vs Trapinator traps at killing possums in Fiordland.*” (Planning template DOCDM-528648). This trial consists of 60 Sentinel and 60 Trapinator traps set up along the stoat lines in the Gulliver, Tutoko, and Cleddau road sites in between these two catchments (Appendix 3). Possum traps are set one metre off the ground (Fig 5) and 100m apart each, and have been baited with Connovation 'Smooth in a Tube' paste at the same frequency as the stoat traps have been checked. Traps were installed alternating with two Trapinator then two Sentinel trap types, to remove any bias that may have been caused by having all of one type adjacent to a stoat trap site (as would have happened if they were simply alternated).

Prior to the traps being deployed a possum trend monitor was conducted in the Cleddau trial area. The average result recorded for the site was 6.1% RTC from 17 lines, however, there was a higher possum density in the Gulliver at 12% RTC compared to the Tutoko at 4%.

Results from the first sixteen months of this trial show that the Sentinel trap design caught considerably more possums compared with the Trapinator design. The original design of the trigger bars in the Trapinator meant that the traps had a heavier spring-off weight compared with the Sentinel traps. The trigger bar has been redesigned by the manufacturers and the new design bars were installed into the traps in September 2011. This trial will run for one more year and then the results will be written up after possum densities have been remeasured within the trial site.

	POSSUMS CAUGHT	SPRUNG/EMPTY
SENTINEL (n= 60)	71	17
TRAPINATOR (n= 60)	22	10
TOTAL	93	27



Figure 5- Sentinel possum trap in the Tutoko Valley

# Cat control and surveillance

There has been sporadic cat sign and sightings over the last ten years in the lower Clinton Valley, particularly between Glade wharf and Glade House (Appendix 2). A dark coloured cat was caught in a DOC-250 stoat trap box set near the wharf during winter 2011. Cat sightings have been more common from around Nurse Creek, and it is possible that wandering cats may be moving around the lakeshore up to the mouth of the Clinton Valley.

Traps were set up this season to try and intercept any cats moving through the area, and prevent them establishing. Ten cat kill-traps were set up in the Glade vicinity in December 2010; see Appendix 2 for location map. Most are Timms traps with the entrance hole slightly enlarged, and raised off the ground with a leaning board to exclude access from ground birds such as weka and kiwi (Fig 6). The design differs slightly from the current Best Practise set (DOCDM-339852) as the trap is mounted directly onto the leaning board rather than onto a separate horizontal platform. The cat traps have been checked and rebaited with rabbit meat each time the stoat traps have been serviced. No cats were caught this season after the first one during winter.



Figure 6- Timms trap raised on a leaning board near Glade wharf

It is planned to continue running the current cat traps plus install more next season, including some Belisle Super-X 220 traps set in 'submarine' or 'chimney' tunnels (DOCDM-339850). Any new trap designs installed will have to exclude weka.

# Outcome Monitoring

## Whio

Monitoring of the whio (blue duck) population in the Clinton/Arthur area began in 2000 in response to a perceived general decline in whio numbers nationally. Introduced predators, particularly stoats were presumed to be responsible for causing a significant proportion of the decline (Willans & Torr 2001).

During the six seasons the intensive monitoring programme ran stoats were identified as the main agent of decline of whio populations in Fiordland. In the absence of stoat control whio experienced high nest failure due to stoat predation and all adult female mortality was attributed to stoat predation. In comparison, nesting success improved significantly once stoat control was established and the proportion of females killed by stoats decreased (Whitehead *et al* 2007).

Since 2007/08 the whio monitoring regime has changed as the stoat trapped area has expanded and a nationwide monitoring protocol has been established. Intensive individual nest monitoring has been replaced with walk-through river surveys twice per year. All whio seen on the river are counted, and the numbers of pairs and individuals can be compared with other seasons. Some banded birds from the productivity and survival study remain in the population and are a useful long-term reference.

### ***Summary of Whio Productivity in the Northern Fiordland Whio Protection Area for 2010/11***

CATCHMENT	SURVEYED RIVER LENGTH (KM)	KNOWN PAIRS	PAIRS / KM	DUCKLINGS SEEN	JUVENILES SEEN	FLEDGED JUVENILES / PAIR	SINGLE BIRDS
Clinton	22	10	0.45	22	22	2.20	1
Arthur	14	7	0.50	20	20	2.86	4
North Branch	16	7	0.44	21	20	2.86	1
Neale Burn	14	1	0.07	0	0	0	2
Joes	9.2	5	0.54	3	3	0.60	4
Cleddau/Tutoko	18.3	5	0.27	2	2	0.40	3
Worsley/Castle	24.7	9	0.36	10	10	1.11	5
<b>Total</b>	<b>118.2</b>	<b>44</b>	<b>0.37</b>	<b>78</b>	<b>77</b>	<b>1.75</b>	<b>20</b>

The number of ducklings and juveniles seen this season was the highest recorded since the monitoring programme began in 2000.

## Number of known whio pairs in the surveyed area 2000-2011

Season	Catchment					
	Clinton/ Neale	Arthur	Cleddau/ Tutoko/ Gulliver	North Branch	Joes	Worsley/ Castle
2000/2001	5*	6		?*		
2001/2002	4	6		?		
2002/2003	3	6*	4*	?		
2003/2004	3	5	5	?		
2004/2005	4	6	5	0		3
2005/2006	8	5	6	2	4*	2*
2006/2007	10	5	4	5	6	4
2007/2008	8	7	6	2	8	6
2008/2009	8	7	3#	3	8	6
2009/2010	11	6	6	3	8	3
2010/2011	11	7	5	7	5	9

\* Stoat trapping started

# Three pairs known from 2007/2008 were not located in 2008/2009, but were found again in 2009/2010.

The total number of whio pairs within the stoat trapped area continues to grow towards the 50 pair target. Many sections of good river habitat have pairs established now; however there are still sections of unoccupied habitat available particularly in the Neale Burn.

A more detailed summary of the 2010/11 whio monitoring programme is available in the whio annual report (Smart & Loe 2011), and totals are summarised in DOCDM-767545. Population growth estimates for the Clinton and Arthur study area are provided in Whitehead *et al* (2007).

## WhiONE

Sponsorship was provided by the Fiordland Wapiti Foundation, through Paradise Valley Springs Wildlife Park in Rotorua, to perform WhiONE (whio Operation Nest Egg) to boost the whio population in the Worsley/Castle catchment where they manage stoat control. Clutches laid early in the season were removed enabling each pair to re-nest, potentially doubling their productivity. Thirteen eggs were harvested from nests in the Cleddau, Upper Hollyford and Point Burn Valleys. All eggs hatched successfully and were raised at the Te Anau Wildlife Park. Five of the WhiONE fledglings were released into the Worsley with the other eight fledglings released into the Castle in February 2011 when they were 10-12 weeks old. All release birds were individually colour banded to aid future identification.

## Cleddau forest bird counts

Five-minute bird call counts were conducted in November 2007 at the start of trapping in the Cleddau Delta behind the Milford staff accommodation. Counts were made at every odd numbered trap site (22 total). Call counts were repeated at the same sites this season in November 2010, three years after pest trapping began. Counts were made three to five times at each site at different times of the day as the weather conditions allowed and averaged. The weather was showery during the three days that the counts were made in 2010, but efforts were made to survey in between showers. Counts were made by Jo Whitehead and Jo Filmer.

### Data analysis

The mean number of bird species recorded per count was calculated for 2007 and 2010. Confidence intervals (95%) were calculated using Excel. Data analysis was completed by Jo Whitehead.

### Results

In 2010 there were 26 bird species recorded in the Cleddau Delta, with 20 of these being New Zealand natives (Appendix 5).

The most common bird species in 2010 were bellbirds, tomtits and tui. In comparison the most common species recorded in 2007 were bellbirds, grey warblers and chaffinches. The five-minute bird counts indicate that the three commonest species in 2010 have increased in abundance since the 2007 counts with 95% confidence interval non-overlapping, suggesting that the increase is statistically significant (Fig 7).

**Bellbirds:** The number of bellbirds has increased from  $1.4 \pm 0.2$  calls per count in 2007 to  $3.2 \pm 0.2$  recorded per count site in 2010.

**Tomtits:** Numbers of tomtits have most likely increased over the three years of trapping from  $0.9 \pm 0.1$  per count pre-trapping in 2007 to  $1.7 \pm 0.4$  recorded per count in 2010. This difference appears to be significant with no overlap of 95% confidence intervals.

**Tui:** The number of tui appears to have increased from  $0.7 \pm 0.2$  pre-trapping in 2007 to  $1.3 \pm 0.3$  recorded per count in 2010. This increase is most likely significant with 95% confidence intervals not quite overlapping.

**Fantail:** The number of fantails in the Delta may have increased from  $0.7 \pm 0.2$  per count in 2007 to  $1.1 \pm 0.4$  recorded per count in 2010, although the 95% confidence intervals of these means overlap so the results are unlikely to be significant.

**Grey warblers:** In a reverse trend the number of grey warblers may have decreased between 2007 and 2010 with  $1.1 \pm 0.2$  recorded per site in 2007 compared to just  $0.6 \pm 0.2$  recorded in 2010. Although as the 95% confidence intervals almost overlap this result may not be significant.

**Chaffinch:** The number of chaffinches in the Delta may have decreased over the three years with  $1.1 \pm 0.3$  recorded per site in 2007 and  $0.4 \pm 0.2$  recorded in 2010.

Mean number ( $\pm 95\%$  CI) of birds recorded per count site at the Cleddau Delta, Milford in 2007 & 2010

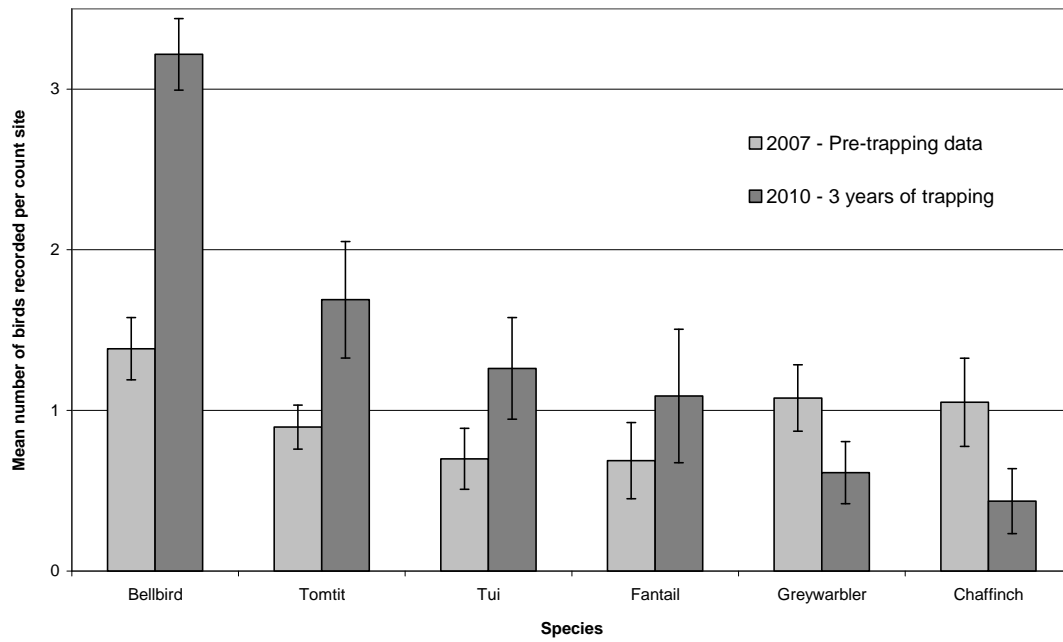


Figure 7- Comparison of the relative abundance of the six most common bird species recorded in the Milford Delta between 2007 and 2010.

Significant trends were not detected in other bird species recorded. Data analysis is stored in DOC DM-233370, and all mean call counts per species are provided in Appendix 5.



# Robin transfer and release

On the 30<sup>th</sup> March 2011 24 South Island robins were transferred from the Eglinton Valley and released into the Cleddau Delta trapped area at Milford Sound. Birds were caught using hand nets and all were banded with a metal and a pink leg band. Four students from Fiordland College assisted Department of Conservation staff during the day catching robins.

Twenty four robins were caught across several sites along the road between Smithy Creek and Cascade Creek, and were then driven through to Milford and released the same afternoon.

EcoTours / Cruize Milford sponsored the cost of planning and carrying out the transfer of robins and Cruize Milford staff members Kate Sweetman and Russell Delahunty assisted with the release of the robins into their new home. Robins are believed to have been absent from the Cleddau and Arthur catchments prior to the transfer in March 2011.



## Budget 2010/11

Salary (Part of two staff)	\$43,500
Wages	\$1,600
Allowances	\$1,400
Computer lease	\$1,900
Trapping contractor	\$4,900
Helicopter hire	\$8,800
Trap bait	\$1,500
Vehicle fuel & licensing	\$2,800
Trap costs	\$400
Groceries	\$800
Safety gear & field equipment	\$600
Postage & freight	\$100
TOTAL	\$68,300

## Plans for 2011/12

- Continue stoat trapping within the current network. Trap checks in the Tutoko & Gulliver will be tendered out to contractors and 6-8 trap rounds will be made during the year.
- Continue to monitor the whio population within the stoat trapped area using walk through river surveys.
- Continue to monitor beech seed fall annually within the Clinton Valley as an early indication of rodent and mustelid levels for the coming season.
- Install additional traps targeting cat in the lower Clinton Valley.

# Acknowledgements

Thanks to the large number of people who have been involved with this project over the 2010/11 season.

Department of Conservation Te Anau Area staff who have assisted with this project by checking traps during this year include Keri Antoniak, Erina Loe, Gerard Hill, Shinji Kameyama, Ross Harraway, Pete McMurtrie, Max Smart, Jo Whitehead, Jo Filmer, and Phil Collyns. Max Smart managed the whio monitoring programme and Erina Loe supplied the outcome monitoring results. Thanks to the Milford Track hut wardens who have assisted with the programme, educating the public, and sharing their accommodation with stoat trappers or whio monitoring staff.

The Fiordland Wapiti Foundation assisted by their sponsors and supporters continue to maintain the stoat trap lines in the Worsley and Castle Rivers, providing a valuable extension to the adjacent trapped area. The FWF also helped sponsor the raising of 13 WhiONE ducklings that were released into the Worsley and Castle Rivers in February.

Thanks to Steve Norris and Steve Mancer from Trips 'n Tramps for their ongoing support and regular stoat trap checking along the road in the Cleddau Valley. Thanks to Dick Shefford from the Hollyford Museum Charitable Trust and friends who have checked the traps from Marion Corner to the end of the Hollyford Road on a regular basis. Downers also service the traps in the upper valley. Thanks to all these people for their ongoing support and advocacy checking stoat traps. Eco Tours/Cruise Milford have also sponsored the additional stoat and rat trapping around the Cleddau Delta and funded the robin transfer to Milford this year. Donations from Real Journeys contribute towards the whio monitoring programme.

Thanks to Dean Hansen and Guy Turnbull who had the contract to check and rebait the stoat and possum traps in the Cleddau Delta, Tutoko, and Gulliver valleys in the Cleddau catchment.

Jeff Shanks and Snow Mullally from Milford Helicopters continue to offer efficient air transport into the area. We also acknowledge the boat transport provided by Real Journeys at either end of the track during the walking season. Thanks also to all Ultimate Hikes Milford Track lodge staff and guides who have assisted stoat trappers or offered encouragement while out on the track.

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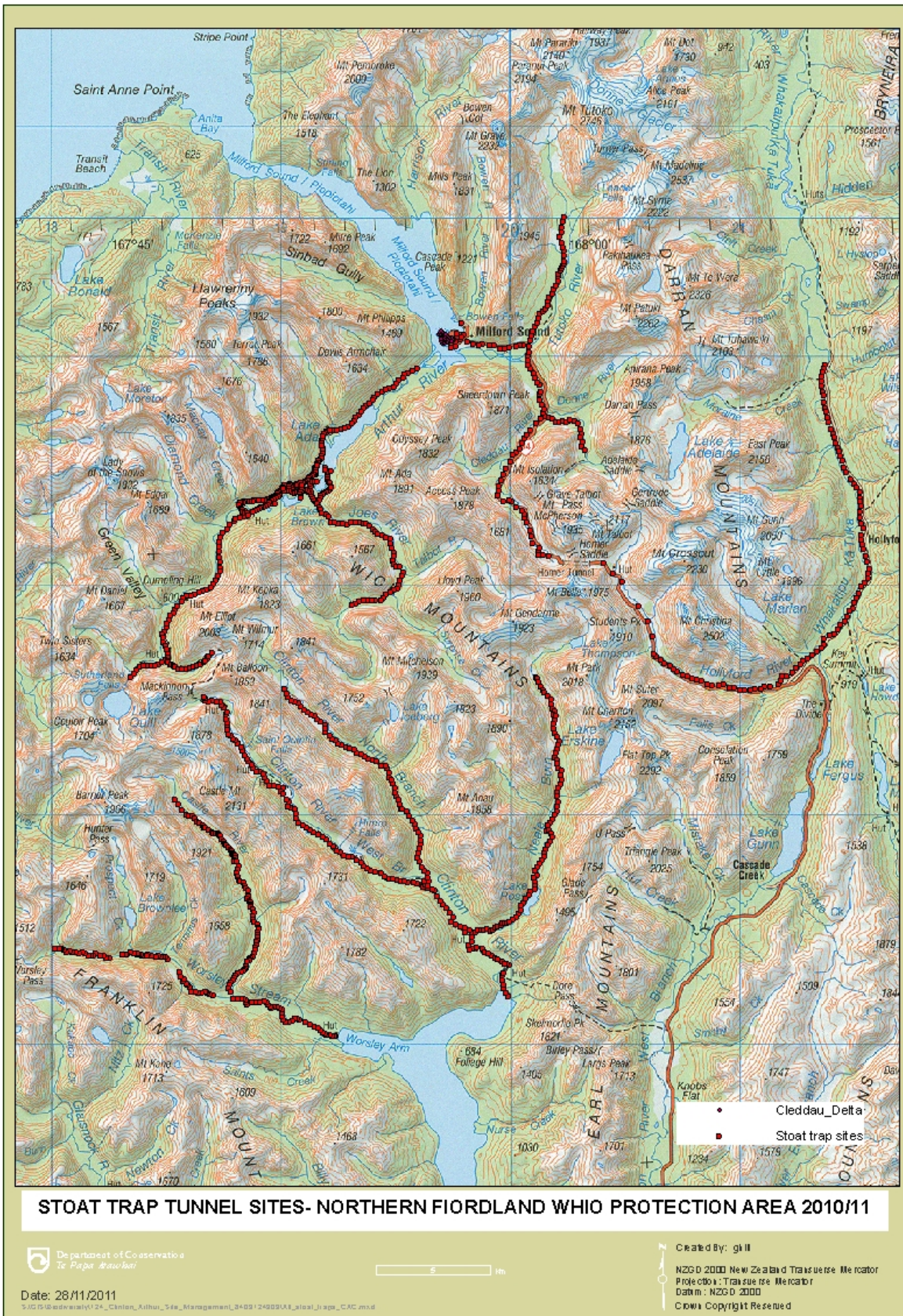
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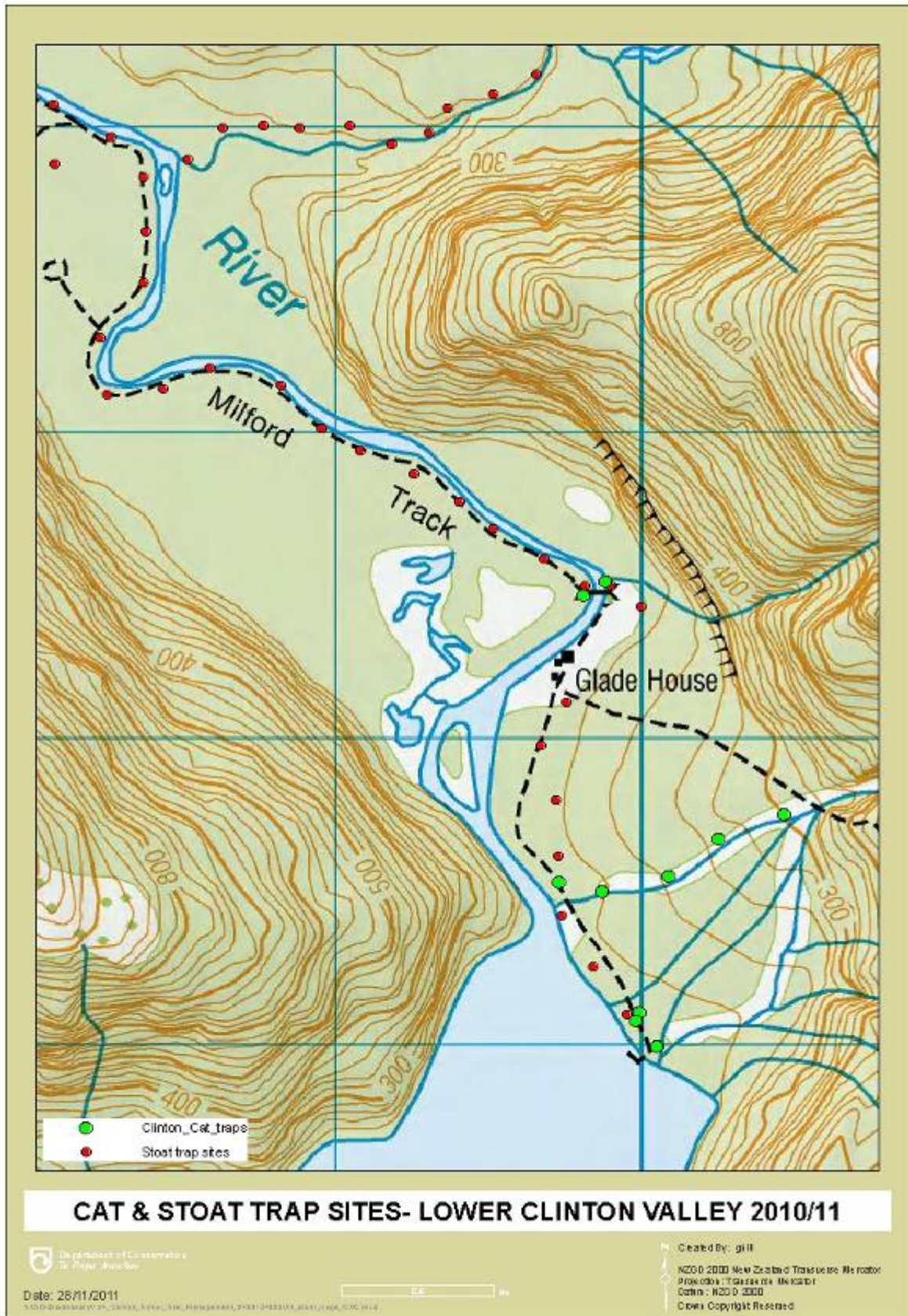
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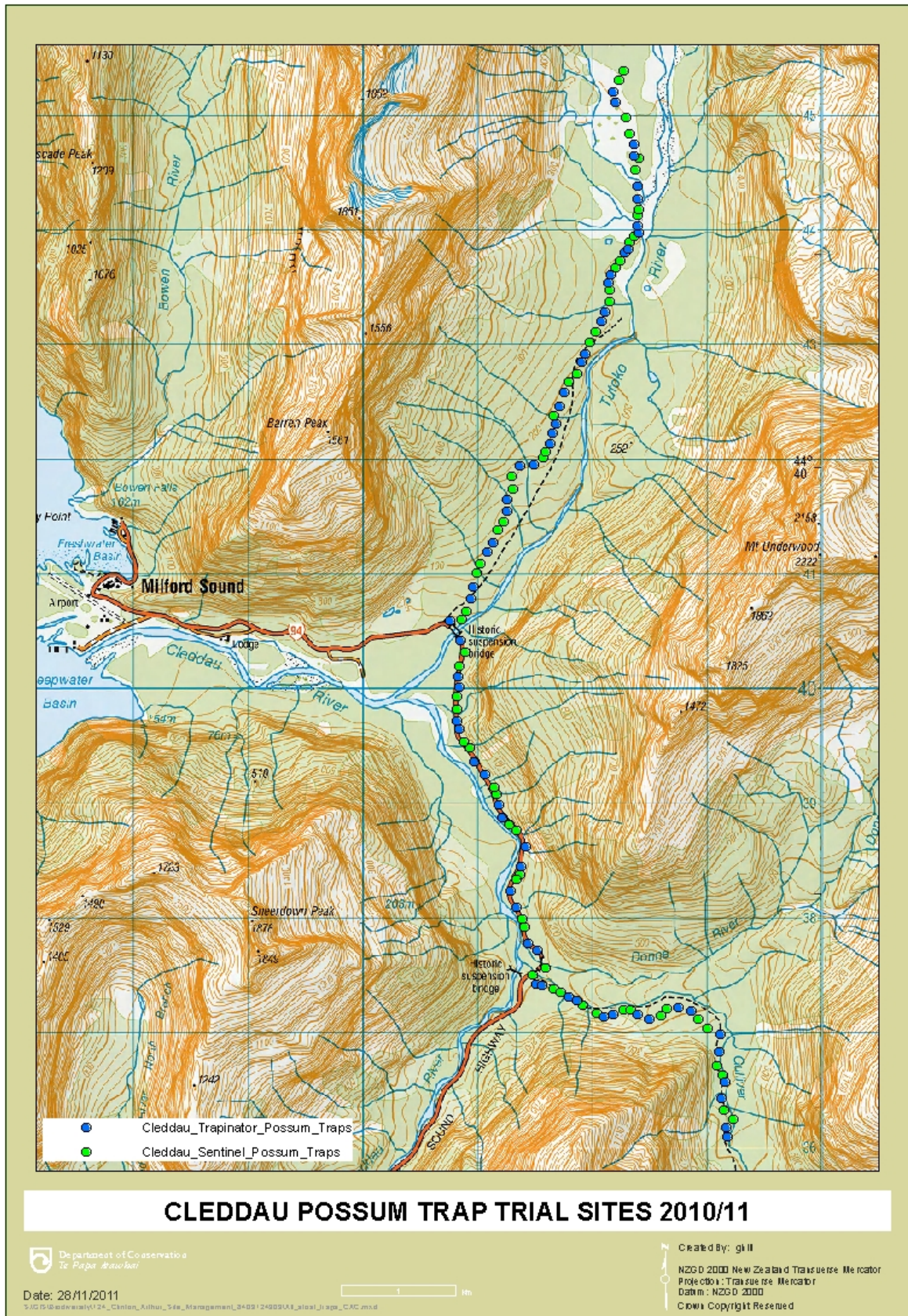
# Appendix 1



# Appendix 2



# Appendix 3



# Appendix 4

## Trap capture results per month 2010/11

	<u>Clinton/Neale Burn</u>			<u>Arthur/Joes/Ada</u>			<u>Cleddau</u>		
	Stoat	Rat	Other	Stoat	Rat	Other	Stoat	Rat	Other
Jul-10	-	-	-	1	7	0	4	0	0
Aug-10	-	-	-	-	-	-	2	29	0
Sep-10	19	40	0	11	39	0	-	-	-
Oct-10	3	14	1	1	24	0	0	5	0
Nov-10	-	-	-	3	11	0	2	17	0
Dec-10	12	7	1	2	17	1	7	4	0
Jan-11	6	6	0	18	12	0	8	3	0
Feb-11	27	5	1	16	9	1	11	7	0
Mar-11	28	14	0	16	13	0	14	5	1
Apr-11	3	38	2	3	31	0	9	16	1
May-11	-	-	-	1	13	0	3	33	1
Jun-11	-	-	-	1	34	0	1	12	0
<b>TOTAL</b>	<b>98</b>	<b>124</b>	<b>5</b>	<b>73</b>	<b>210</b>	<b>2</b>	<b>61</b>	<b>131</b>	<b>3</b>

\*Other includes weasel, possum, or bird. Full details are recorded in DOCDM-218757.



# Appendix 5

		Belbird, (mainland)	Tomtit, Sth Is	Tui	Fantail, Sth Is	Warbler, Grey	Chaffinch	Redpoll	Thrush, Song	Blackbird	Silvereye	Oystercatcher, Variable	Creeper, Brown	Shelduck, Paradise	Weka, sp	Cuckoo, Long-tailed	Kingfisher, NZ
<b>2007</b>	<b>mean</b>	<b>1.38</b>	<b>0.9</b>	<b>0.7</b>	<b>0.69</b>	<b>1.08</b>	<b>1.05</b>	<b>0.68</b>	<b>0.05</b>	<b>0.39</b>	<b>0.09</b>	<b>0.08</b>	<b>0.19</b>	<b>0.14</b>	<b>0.03</b>	<b>0.01</b>	<b>0.12</b>
	$\pm$ 95% CI	0.19	0.14	0.19	0.24	0.21	0.27	0.3	0.03	0.12	0.07	0.07	0.11	0.12	0.03	0.01	0.04
<b>2010</b>	<b>Mean</b>	<b>3.22</b>	<b>1.69</b>	<b>1.26</b>	<b>1.09</b>	<b>0.61</b>	<b>0.43</b>	<b>0.34</b>	<b>0.23</b>	<b>0.21</b>	<b>0.2</b>	<b>0.19</b>	<b>0.19</b>	<b>0.14</b>	<b>0.14</b>	<b>0.12</b>	<b>0.08</b>
	$\pm$ 95% CI	0.22	0.36	0.32	0.42	0.19	0.2	0.26	0.12	0.1	0.11	0.11	0.17	0.11	0.16	0.09	0.07
		Dunnoek (Hedge Sparrow)	Gull, Southern Black-backed	P. Parakeet spp. / Kakariki spp	Pigeon, NZ/Kereru/Kupapa	Kea	Scaup, NZ	Duck, Mallard	Rifleman, South Is	Kaka, Sth Is	sparrow, house	Plover, Spur-winged	Unknown	Goose, Canada	Gull, Black-billed	Starling	Duck, Paradise
<b>2007</b>	<b>mean</b>	<b>0.06</b>	<b>0.01</b>	<b>0.22</b>	<b>0.07</b>	<b>0.05</b>	<b>0.02</b>	<b>0.05</b>	<b>0.23</b>	<b>0.08</b>	<b>0</b>	<b>0.01</b>	<b>0</b>	<b>0.01</b>	<b>0.01</b>	<b>0.2</b>	<b>0.02</b>
	$\pm$ 95% CI	0.05	0.01	0.1	0.04	0.05	0.04	0.06	0.19	0.07	0	0.01	0	0.03	0.01	0.11	0.03
<b>2010</b>	<b>Mean</b>	<b>0.08</b>	<b>0.06</b>	<b>0.05</b>	<b>0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>0.02</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>0</b>	<b>0.24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	$\pm$ 95% CI	0.06	0.07	0.05	0.05	0.04	0.04	0.03	0.06	0.03	0.02	0	0.12	0	0	0	0

The mean number of bird calls recorded per five minute bird count pre (2007) and post (2010) trapping in the Cleddau Delta, Milford Sound.